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REVISION AND SUBMITTAL OF THE SITE-WIDE CHARACTERIZATION REPORT

02/18/93

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LETTER

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Department of Energy
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FEB 18 1993
DOE-1139-93

Mr. James A. Saric, Remedial Project Director
U.S. Environment Protection Agency
Region V - 5HRE-8J
77 West Jackson Street
Chicago, Illinois 60604

Mr. Graham E. Mitchell, Project Manager
Ohio Environmental Protection Agency
40 South Main Street
Dayton, Ohio 45402

Dear Mr. Saric and Mr. Mitchell:

REVISION AND SUBMITTAL OF THE SITE-WIDE CHARACTERIZATION REPORT

References: 1) Letter, J. A. Saric to J. R. Craig, "Approval of the Site-Wide Characterization Report Response to Comments," January 20, 1993

2) Letter, G. E. Mitchell to J. R. Craig, "Approval of the Site-Wide Characterization Report Response to Comments," January 20, 1993

The above referenced letters indicate that the response to comments that the United States Department of Energy (U.S. DOE) provided as a result of the initial disapproval of the Site-wide Characterization Report (SWCR), are essentially satisfactory and that the document shall be revised and re-issued within 30 days. It should be noted that the revision and re-issuance of the document is predicated upon the successful incorporation of several additional comments. It is the position of the DOE that these additional comments raise several important issues with respect to revision of the SWCR within the original intent and scope of the document. The purpose of this letter is, therefore, to officially invoke the twenty-day extension on revision of the SWCR as provided in the Amended Consent Agreement (ACA) and to provide the DOE position with respect to the additional comments as provided by the United States Environmental Protection Agency (U.S. EPA) and Ohio Environmental Protection Agency (OEPA).

To fully incorporate the additional comments the resources and time required would be extensive. The DOE believes that some of this effort would be outside the original scope of the SWCR. The following examples illustrate this fact. The incorporation of the new EPA guidance concerning dermal exposure pathways was released after the time frame for information to be

incorporated into the SWCR. The use of background values for various media and the method used to determine contaminants of concern was established prior to issuance of the SWCR with the full intent to modify Operable Unit (OU) specific Baseline Risk Assessments (BRA) as they are developed. To revise the existing SWCR for these specific comments would take valuable resources from the OU BRAs and would not provide for a greater level of consistency or comparability in terms of developing and evaluating remedial action alternatives.

The DOE recommends, for consideration, that these additional comments be addressed in a qualitative fashion in the revised SWCR and the substance of the comments be reflected in the quantitative BRAs accompanying the Remedial Investigation (RI) reports for each OU. This would substantially reduce the time frame and efforts required for finalizing the SWCR and would provide for a connection. Attached is a breakdown of the seven comments that lead to the issues discussed previously. Provided with each comment is the recommended action. Incorporation of the remaining comments and the approved comment responses either have been or are currently being incorporated into the SWCR. The approximate schedule for a revised SWCR document, provided the DOE's recommendations are satisfactory, is the end of March 1993. The document will then need to be compiled for re-issuance to both the U.S. EPA and OEPA in early April 1993. Should additional calculations be required for the SWCR the time frame for revision will naturally be extended and would impact existing OU, RI and Feasibility Study (FS) resources.

If you or your staff should have any additional questions or comments please contact R. C. Janke at (513) 738-6937.

Sincerely,

Jack R. Craig
Fernald Remedial Action
Project Manager

FN:RC Janke

Enclosure: As Stated

cc w/enc.:

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ATTACHMENT

UNRESOLVED ISSUES REGARDING REVISION OF THE SITE-WIDE CHARACTERIZATION REPORT

U. S. EPA Issues

1. Issue

The definition and the use of the Risk-Based Quantitation Limit (RBQL)(Comment #254).

Proposed Resolution

DOE included Appendix N in the August 1992 draft SWCR for submission to EPA. According to the statement: "Part II, Appendix N was not completed in the August 1992 draft provided, so this response cannot be evaluated." (see memo from P. Van Leeuwen to J. Saric on January 14, 1993, regarding Comment #254), Appendix N was apparently missing in the reviewer's copy. With this transmittal, Appendix N, which contains detailed information on RBQLs, is attached.

2. Issue

Use of the Upper 95% Tolerance Limit for background measurements to determine site-related constituents of potential concern (Comment #255).

Proposed Resolution

Request:

1) A meeting or a conference call with the Headquarters statistician, Mr. Paul White, as soon as practical, to discuss this issue.

2) Written guidance and the associated supporting literature from Mr. White on "traditional statistical methods" (see the memo from P. Van Leeuwen to J. Saric on January 14, 1993, regarding Comment #255) for comparing site-related data with the background.

3. Issue

Values of skin surface area (SA) used for dermal contact with soil exposure pathway (Comment #264)

Proposed Resolution

The values of SA used in the Risk Assessment Work Plan Addendum will be changed to 5,000 cm^2 for adults, 3,800 cm^2 for child/teen and 1,800 cm^2 for child < 6 years of age. Provided below is the rationale for using these values:

Using default values from the EPA document "Dermal Exposure Assessment: Principles and Application", January 1992, EPA/600/8-90/011B, Section 8.4, total adult body surface areas of 20,000 cm^2 to 23,000 cm^2 (percentiles

50th-95th) are recommended. From Table 8-4 of the document, total body surface area for child/teen would range from 15,000-18,000 cm^2 (percentiles 50th-95th) and for children <6 years of age would range from 7,000-8,000 cm^2 (percentiles 50th-95th). For soil contact scenarios, dermal exposure was expected to occur at the hands, legs, arm, neck, and head. When clothing scenario is considered, the document recommends that roughly 10% to 25% of the skin area may be exposed to soil. Since some studies have suggested that exposure can occur under clothing, the upper end of this range, i.e., 25%, was selected in the document for deriving default values. Thus, applying 25% to the total body surface area results in default values for adults of 5,000 to 5,800 cm^2, for child/teen of 3,800 to 4,500 cm^2, and for children of 1,800 to 2,000 cm^2, respectively. Since RAGs, Sections 6.6.1 and 6.6.2 state that 50th percentile values, instead of 95th percentile values, should be used for the area of exposed skin (SA) to calculate the reasonable maximum exposure for the dermal contact pathways, 5,000 cm^2 for adults and 1,800 cm^2 for children will be used for the SA values in the Risk Assessment Work Plan Addendum. The reason why 50th percentile values are used but not 95th percentile value is given in the RAGs, Section 6.6.1 as follows:

> "Surface area and body weight are strongly correlated and 50th percentile values are most representative of the surface are of individuals of average weight (e.g. 70 kg) which is assumed to this and all other exposure pathways. Estimates of exposure for this pathway are still regarded as conservative because generally conservative assumptions are used to estimate dermal absorption (PC) and exposure frequency and duration."

4. Issue

Use of the Murphy vs. Andelman models for calculation of volatiles released by household water (Comment #269).

Proposed Resolution

The Murphy model has been used to estimate volatile release by household water use for the Site-Wide, OU2, and OU4 Baseline Risk Assessments. However, the release of volatiles has never been a significant exposure-pathway for previous risk assessments. This is also true for OU1 that is currently in preparation. Use of the Andelman model would not have affected the results of the total risks associated with the water use. Table 1 shows that the HI/risk from volatile inhalation is much lower than the total HI/risks associated with the water use from all chemicals. However, DOE will use the Andelman model for OU3 and OU5 to estimate the release of volatiles from household water in the future.

TABLE 1

COMPARISON OF HI/RISKS FOR ALL PATHWAYS ASSOCIATED WITH ALL CHEMICALS AND VOLATILE INHALATION PATHWAY

Current/Groundwater/off-property farmer

HI value

	HI from volatile inhalation	HI from all chemicals & all pathways
Well 2060	$7x10^{-4}$	10
Well 2095	$5x10^{-4}$	20
Well 3126	$3x10^{-4}$	30

Cancer Risk

	Risk from volatile inhalation	Risk from all chemicals & all pathways
Well 2094	$5x10^{-5}$	$1x10^{-3}$
Well 3126	$3x10^{-7}$	$3x10^{-4}$

No volatiles of potential concern are identified in other wells.

Future/Groundwater/off-property farmer

No volatiles of potential concern are identified in groundwater based on the fate and transport modeling results for the future land-use scenario.

Current/Surface Water/off-property Water Users

No volatiles of potential concern are identified in surface water under current land-use scenarios.

Future/Surface Water/off-property Water Users

HI value

HI from volatile inhalation	HI from all chemicals & all pathways
$2x10^{-8}$	1

No volatiles of potential concern are identified in surface water that pose cancer risks under future land-use scenarios.

5. Issue

New dermal guidance from EPA has been and will be used in the OU-specific risk assessments but not in the SWCR (Comments #277 and #278).

Proposed Resolution

The original risk calculations for dermal pathways were performed using what dermal exposure information was available in early 1992. New guidance from EPA on dermal exposure assessment continues to be published. The results of the risk calculations in the SWCR showed that dermal exposure pathways were usually overshadowed by other pathways such as ingestion on vegetables, meat and milk. In addition, it is not a trivial amount of work to incorporate any new dermal exposure guidance into the SWCR. The following tasks would be required:

- review skin permeability and absorption coefficients for all chemicals of potential concern in water and soil and update these factors in the exposure models where necessary
- identify gastrointestinal absorption efficiency factors from all chemicals of potential concern
- calculate dermal toxicity values by modifying oral RfDs and slope factors using the absorption efficiency factors
- recalculate unit risk factors (URFs) and unit toxicity factors (UTFs) for all chemicals with updated coefficients or toxicity factors, for all receptor scenarios where dermal contact with soil of water is an exposure pathway
- recalculate risks and hazard quotients for dermal exposure pathways
- recalculate total risks and hazard indices across all pathways for those receptor scenarios where dermal contact with soil or water is an important pathway (i.e. dermal exposures result in non-negligible risks)
- update toxicity value tables (2)
- update URF and UTF tables (8)
- update discussion of results, if necessary

Because this is a low priority exposure pathway and the inclusion of any new dermal exposure guidance into the SWCR is a very time-consuming task, a waiver of revisions of the dermal exposure pathway for the SWCR is requested.

OEPA ISSUES

1. Issue

Adequacy of DOE's background sampling for all media (the general comment on the SWCR comment response document)

Proposed Resolution

Doe will state within the SWCR that the background concentrations reported in the document are being reevaluated and the background issue will also be addressed in all OU RI reports. It should be noted, however, that because site-specific background sampling is a continuing process to be completed for all media, OU RIs are only able to use existing site-specific background concentrations available at the time of preparation.

2. Issue

Risk estimates associated with perched groundwater (Comment #470).

Proposed Resolution

DOE agrees that the perched water zone present at the FEMP may yield sufficient volumes of water to serve as a household drinking water source. DOE proposes that the drinking water pathway be evaluated as necessary, in the baseline risk assessment accompanying each OU Remedial Investigation report. DOE further proposes that this pathway not be included quantitatively, but rather qualitatively, in the Site-Wide Characterization Report's preliminary baseline risk assessment. This proposal is consistent with DOE's interpretation of the agreement reached with EPA in the November 5, 1992 meeting on the SWCR.

APPENDIX N

CRITERION TO EXCLUDE UNUSUALLY HIGH SAMPLE QUANTITATION LIMITS FOR CHEMICAL CONSTITUENTS

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N.1.0 INTRODUCTION

When the concentration of a chemical constituent (ion, element, or compound) in an environmental medium (air, water, soil or sediment) can not be reliably measured in a sample that is analyzed, the concentration of the chemical is reported at the Sample Quantitation Limit (SQL) and is qualified with a U (hereafter referred to as a U-qualified datum). In other words, if data are U-qualified, this indicates that the amount of the constituent, if present at all in the sample, is below the SQL. Thus a value of 0.45 $\mu g/\ell$ (U) reported by the laboratory as the concentration of uranium in milk means that the uranium concentration was less than 0.45 $\mu g/\ell$, and the uranium concentration could actually have been any value from 0.00 to 0.44 $\mu g/\ell$.

The SQL is not the same for all chemical constituents. These variations exist because of differences in chemical and physical properties of the constituents in addition to differences in the capabilities of instruments available to measure these properties.

Also, the SQL is not always the same for a specific constituent in all samples of the same environmental medium. For example, the SQL for uranium in groundwater samples may vary for water samples from two different locations. This is due to variations in the kinds or amounts of other substances in the two samples that can interfere with the analysis.

In addition, the SQL for a constituent will not always be the same for identical samples that are from the same location, but that are analyzed at different times. Differences in SQLs can occur as a consequence of unavoidable minor fluctuations from time to time in the performance of analytical instrumentation used for sample analysis (WMCO 1991).

If a constituent is detected at least once in a given set of data, statistical analysis is performed on the data set for use in subsequent exposure and risk calculations. To obtain the mean, upper 95 percent confidence limit on the mean (UCL), or other statistical parameters, one-half the SQL is used to represent the concentration of the constituent in U-qualified samples. In some cases, however, an SQL may greatly exceed other measured values in a data set and this high value could therefore result in biased statistical parameters. This could lead to erroneous risk estimates even though the constituent may not be present. In this case it may be best to delete such a value (EPA 1989a). This appendix provides the criterion by which a high SQL is excluded from a data set (see Section N.2.0) to avoid using biased statistical parameters for a data set and to avoid arriving at misleading conclusions in the risk assessment.

This appendix does not address the problem of high detection limits for radiological analyses. Generally, results for radiological analyses do not exceed Fernald Environmental Management Project (FEMP)-specific detection limits. Instances where radioanalytical results are reported with high detection limits (e.g., certain analytes in Operable Unit 4 silo samples) are addressed on a case-by-case basis.

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N.2.0 CRITERION TO EXCLUDE AN UNUSUALLY HIGH SQL

If the SQL of a U-qualified sample from an environmental medium exceeds both the Contract Required Quantitation Limit (CRQL) and the Risk-Based Quantitation Limit (RBQL), the datum is not considered suitable for quantitative use and is removed from the data set prior to statistical analysis.

The CRQL is a chemical-specific level that a Contract Laboratory Program (CLP) laboratory must be able to routinely and reliably detect and quantitate in specified sample matrices. The CRQL may or may not be equal to the reported quantitation limit for a given chemical in a given sample (EPA 1989b). The CRQL values for various chemicals in soil/sediment and water are specified by the EPA's CLP (EPA 1988) and are listed in Tables N.2-1 and N.2-2, respectively.

An RBQL is the concentration of a constituent in a given medium that would result in an incremental lifetime cancer risk (ILCR) of 1×10^{-6} for carcinogens or a hazard index of 1.0 for noncarcinogens under specified exposure scenarios. These scenarios are:

- Exposure Scenario for Soil
  - Carcinogens: a person ingests 100 mg/day of soil throughout a 70-year lifetime (EPA 1989b)
  - NonCarcinogens: a child ingests 200 mg/day of soil from age 0 to 6 (EPA 1989b)

- Exposure Scenario for Water
  - Carcinogens: a person ingests 2 ℓ/day of water throughout a 70-year lifetime (EPA 1989b)
  - Noncarcinogens: A person ingests 2 ℓ/day of water throughout a 70-year lifetime (EPA 1989b).

Calculation of RBQLs is described in Section N.3.0.

TABLE N.2-1

CRQL/RBQL VALUES FOR CHEMICALS IN SOIL/SEDIMENT

Chemical	CRQL	RBQL
1,1-Dichloroethane	0.01	8000.0
1,1-Dichloroethene	0.01	1.17
1,1,1-Trichloroethane	0.01	7200.0
1,2-Dibromo-3-chloropropane	--	0.0318
1,2-Dibromoethane	--	0.00824
1,2-Dichlorobenzene	0.33	7200.0
1,2-Dichloroethane	0.01	7.68
trans-1,2-Dichloroethene	0.01	1600
1,2-Dichloroethylene	0.01	800.0
1,2-Dichloropropane	0.01	10.3
1,1,2,-Tetrachloroethane	--	3.5
1,1,2,2-Tetrachloroethane	0.01	3.5
1,2,3-Trichloropropane	--	480
1,2,4-Trichlorobenzene	0.33	105
1,3-Dichlorobenzene	0.33	--
cis-1,3-Dichloropropene	0.01	3.89
trans-1,3-Dichloropropene	0.01	3.89
1,4-Dioxane	--	63.6
1,4-Dichlorobenzene	0.33	29.2
trans-1,4-Dichloro-2-butene	--	0.075
2-Butanone	0.01	4000.0
2-Chloro-1,3-butadiene	--	1600
2-Chlorophenol	0.33	400.0
2-Chloronaphthalene	0.33	--
2-Hexanone	0.01	--
2-Methylnaphthalene	0.33	--
2-Methylphenol	0.33	--

TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
2-Nitroaniline	0.8	--
2-Nitrophenol	0.33	--
2,4-Dichlorophenol	0.33	240
2,4-Dinitrophenol	0.8	160
2,4-Dichlorophenoxyacetic acid	0.33	800.0
2,4-Dinitrotoluene	0.33	1.0
2,4,5-Trichlorophenol	0.8	8000
2,4,5-Trichlorophenoxyacetic	--	800
2,4,6-Trichlorophenol	0.33	63.6
2,6-Dinitrotoluene	0.33	1
3-Chloropropene	--	4000
3-Nitroaniline	0.8	--
3,3-Dichlorobenzidine	0.33	1.56
4-Chloro-3-methylphenol	0.33	--
4-Chloroaniline	0.33	320
4-Chlorophenylphenyl ether	0.33	--
4-Methyl-2-pentanone	0.01	--
4-Methylphenol	0.33	--
4-Nitroaniline	0.8	--
4-Nitrophenol	0.8	--
4,4'-DDD	0.0033	2.92
4,4'-DDE	0.0033	2.06
4,4'-DDT	0.0033	2.06
4,6-Dinitro-2-methylphenol	0.8	--
Acenaphthene	0.33	4800.0
Acenaphthylene	0.33	--
Acetone	0.01	8000.0
Acetonitrile	--	480

TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
Acrolein	--	2.29
Acrylonitrile	--	1.3
Aldrin	0.0017	0.0412
Aluminum	20.0	--
Ammonia	--	77700.0
Anthracene	0.33	24000.0
Antimony	6.0	32
Aroclor	0.033	0.0909
Aroclor-1016	0.033	0.0909
Aroclor-1221	0.067	0.0909
Aroclor-1232	0.033	0.0909
Aroclor-1242	0.033	0.0909
Aroclor-1248	0.033	0.0909
Aroclor-1254	0.033	0.0909
Aroclor-1260	0.033	0.0909
Arsenic	1.0	0.014
alpha-BHC	0.0017	0.111
beta-BHC	0.0017	0.389
delta-BHC	0.0017	0.389
gamma-BHC (Lindane)	0.0017	0.53
Barium	20	4000.0
Benzene	0.01	24.1
Benzo(a)anthracene	0.33	--
Benzo(b)fluoranthene	0.33	--
Benzo(k)fluoranthene	0.33	--
Benzo(a)pyrene	0.33	0.0609
Benzo(g,h,i)perylene	0.33	--
Benzoic acid	--	320000

TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
Benzyl alcohol	--	24000
Benzyl(b)fluoranthene	0.33	--
Benyl(k)fluoranthene	0.33	--
Beryllium	0.5	0.163
Bis(2-chloroethyl)ether	0.33	0.636
Bis(2-chloroethoxy)methane	0.33	--
Bis(2-chloroisopropyl)ether	--	3200
Bis(2-ethylhexyl)phthalate	0.33	50
Boron	--	7200
Bromodichloromethane	0.01	5.38
Bromoform	0.01	88.6
Bromomethane	0.01	112.0
Butylbenzylphthalate	0.33	16000
Cadmium	0.5	40.0
Calcium	500.0	--
Carbon disulfide	0.01	8000.0
Carbon tetrachloride	0.01	5.38
Chlordane	0.0017	0.538
alpha-Chlordane	0.0017	0.389
gamma-Chlordane	0.0017	0.538
Chlorobenzene	0.01	1600.0
Chlorobenzilate	--	1600
Chloroethane	0.01	251000.0
Chloroform	0.01	115.0
Chloromethane	0.01	53.8
Chromium	1.0	400.0
Chrysene	0.33	--
Cobalt	5.0	208.0

TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
Copper	2.5	2970.0
Cyanide	--	1600.0
Di-n-butyl phthalate	0.33	8000.0
Di-n-octyl phthalate	0.33	1600.0
Dibenzo(a,h)anthracene	0.33	--
Dibenzofuran	0.33	800
Dibromochloromethane	0.01	1600.0
Dibromomethane	--	800.0
Dichlorodifluoromethane	--	16000
Dieldrin	0.0033	0.0438
Diethyl phthalate	0.33	64000
Dimethyl phthalate	--	80000
Dinoseb	--	700
Disulfoton	--	3.2
Endosulfan I	0.0017	4
Endosulfan II	0.0033	4
Endosulfan sulfate	0.0033	--
Endrin	0.0033	24
Endrin ketone	0.0033	--
Ethyl benzene	0.01	800.0
Ethyl methacrylate	--	7200
Fluoride	--	4800.0
Fluoranthene	0.33	3200
Fluorene	0.33	3200.0
Heptachlor	0.0017	0.156
Heptachlor epoxide	0.0017	0.0769
Hexachlorobenzene	0.33	0.44
Hexachlorobutadiene	0.33	8.97

TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
Hexachlorocyclopentadiene	0.33	560
Hexachloroethane	0.33	50
Indeno(1,2,3-cd)pyrene	0.33	--
Iron	10.0	--
Isobutyl alcohol	--	24000
Isophorone	0.33	171.0
Lead	0.5	55.2
Magnesium	500	--
Malathion	--	1600
Manganese	1.5	8000.0
Mercury	0.02	24.0
Methacrylonitrile	--	8
Methyl parathion	--	20.0
Methylene chloride	0.01	93.3
Methyl methacrylate	--	6400
Methoxychlor	0.017	400
Molybdenum	--	320.0
Naphthalene	0.33	320.0
Nickel	4	1600
Nitrobenzene	0.33	40.0
N-nitroso-di-n-propylamine	0.33	0.1
N-nitrosodiphenylamine	0.33	143
Parathion methyl	--	20.0
Pentachlorophenol	0.8	5.83
Phenanthrene	0.33	--
Phenol	0.33	48000.0
Potassium	500	--
Pyrene	0.33	2400.0

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TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
Pyridine	--	80
Selenium	0.5	400.0
Silver	1.0	240.0
Styrene	0.01	23.3
Tetrachlorethene	0.01	13.7
Tetraethyldithiopyrophosphate	--	40.0
Thallium	1.0	5.6
Tin	--	48000
Toluene	0.01	16000.0
Toxaphene	--	0.636
Trichloroethene	0.01	63.6
Trichlorofluoromethane	--	24000
Vanadium	5.0	560.0
Vinyl acetate	--	80000.0
Vinyl chloride	0.01	0.368
Total xylenes	0.01	160000.0
Zinc	2.0	16000.0

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TABLE N.2-2

CRQL/RBQL VALUES FOR CHEMICALS IN WATER

Chemical	CRQL	RBQL
1,1-Dichloroethane	0.01	3.5
1,1-Dichloroethene	0.01	0.0000583
1,1,1-Trichloroethane	0.01	3.15
1,2-Dichlorobenzene	0.01	3.15
1,2-Dichloroethane	0.01	0.000384
1,2-Dichloroethylene	0.01	0.35
1,2-Dichloropropane	0.01	0.000515
1,1,2-Trichloroethane	0.01	0.000614
1,1,2,2-Tetrachloroethane	0.01	0.000175
1,2,4-Trichlorobenzene	0.01	0.0459
1,3-Dichlorobenzene	0.01	--
cis-1,3-Dichloropropene	0.01	0.000194
trans-1,3-Dichloropropene	0.01	0.000194
1,4-Dichlorobenzene	0.01	0.00146
2-Butanone	0.01	1.75
2-Chlorophenol	0.01	0.175
2-Chloronaphthalene	0.01	--
2-Hexanone	0.01	--
2-Methylnaphthalene	0.01	--
2-Methylphenol	0.01	--
2-Nitroaniline	0.025	--
2-Nitrophenol	0.01	--
2,4-Dichlorophenol	0.01	0.105
2,4-Dinitrophenol	0.025	0.07
2,4-Dichlorophenoxyacetic acid	--	0.35
2,4-Dimethylphenol	0.01	0.7
2,4-Dinitrotoluene		

TABLE N.2-2
(Continued)

Chemical	CRQL	RBQL
2,4,5-Trichlorophenol	0.025	3.5
2,4,6-Trichlorophenol	0.01	0.00318
2,6-Dinitrotoluene	0.01	0.0000515
3-Nitroaniline	0.025	--
3,3-Dichlorobenzidine	0.01	0.0000778
4-Bromophenyl phenyl ether	0.01	--
4-Chloro-3-methylphenol	0.01	--
4-Chloroaniline	0.01	0.14
4-Chlorophenylphenyl ether	0.01	--
4-Methyl-2-pentanone	0.01	--
4-Methylphenol		
4-Nitrophenol	0.025	--
4,4'-DDD	0.0001	0.000146
4,4'-DDE	0.0001	0.000103
4,4'-DDT	0.001	0.000103
4,6-Dinitro-2-methylphenol	0.025	--
Acenaphthene	0.01	2.1
Acenaphthylene	0.01	--
Acetone	0.01	3.5
Aldrin	0.00005	0.00000206
Aluminum	2	--
Ammonia	--	34.0
Anthracene	0.01	10.5
Antimony	0.06	0.14
Aroclor-1016	0.001	0.00000455
Aroclor-1221	0.002	0.00000455
Aroclor-1232	0.001	0.00000455
Aroclor-1242	0.001	0.00000455

TABLE N.2-2
(Continued)

Chemical	CRQL	RBQL
Aroclor-1248	0.001	0.00000455
Aroclor-1254	0.001	0.00000455
Aroclor-1260	0.001	0.00000455
Arsenic	0.01	0.0000007
Arsenic, soluble	0.010	0.0000007
alpha-BHC	0.00005	0.00000556
beta-BHC	0.00005	0.0000194
delta-BHC	0.00005	--
gamma-BHC (Lindane)	0.00005	0.0000269
Barium	0.2	1.75
Benzene	0.01	0.0012
Benzo(a)anthracene	0.01	--
Benzo(b)fluoranthene	0.01	--
Benzo(k)fluoranthene	0.01	--
Benzo(a)pyrene	0.01	0.00000304
Benzo(g,h,i)perylene	0.01	--
Benzoic acid	--	140
Benzyl alcohol	--	10.5
Beryllium	0.005	0.00000814
Bis(2-chloroethyl)ether	0.01	0.0000318
Bis(2-chloroethoxy)methane	0.01	--
Bis(2-chloroisopropyl)ether	--	1.4
Bis(2-ethylhexyl)phthalate	0.01	0.0025
Boron	--	3.15
Bromodichloromethane	0.01	0.000269
Bromoform	0.01	0.00443
Bromomethane	0.01	0.049
Butylbenzylphthalate	0.01	7

TABLE N.2-2
(Continued)

Chemical	CRQL	RBQL
Cadmium	0.005	0.0175
Calcium	5	--
Carbon disulfide	0.01	3.5
Carbon tetrachloride	0.01	0.000269
alpha-Chlordane	0.00005	0.0000269
gamma-Chlordane	0.00005	0.0000269
Chlorobenzene	0.01	0.7
Chloroethane	0.01	110.0
Chloroform	0.01	0.00574
Chloromethane	0.01	0.00269
Chromium	0.01	0.175
Chrysene	0.01	--
Cobalt	0.05	--
Copper	0.025	1.3
Cyanide	--	0.7
Diazinon	--	0.0315
Di-n-butyl phthalate	0.01	3.5
Di-n-octyl phthalate	0.01	0.7
Dibenzo(a,h)anthracene	0.01	--
Dibenzofuran	0.01	0.00714
Dibromochloromethane	0.01	0.7
Dieldrin	0.0001	0.00000219
Diethyl phthalate	0.01	28
Dimethyl phthalate	0.01	35
Disulfoton	--	0.0014
Endosulfan I	0.00005	0.00175
Endosulfan II	0.0001	0.00175
Endosulfan sulfate	0.0001	--

TABLE N.2-2
(Continued)

Chemical	CRQL	RBQL
Endrin	0.0001	0.00175
Endrin ketone	0.0001	--
Ethyl benzene	0.01	0.35
Fluoride	--	2.1
Fluoranthene	0.01	1.4
Fluorene	0.01	1.4
Heptachlor	0.00005	0.00000778
Heptachlor epoxide	0.00005	0.00000385
Hexachlorobenzene	0.01	0.0000219
Hexachlorobutadiene	0.01	0.000449
Hexachlorocyclopentadiene	0.01	0.245
Hexachloroethane	0.01	0.0025
Indeno(1,2,3-cd)pyrene	0.01	--
Iron	0.1	--
Isophorone	0.01	0.00854
Lead	0.005	0.0242
Magnesium	5	--
Malathion	--	0.7
Manganese	0.15	3.5
Mercury	0.0002	0.0105
Methylene chloride	0.01	0.00467
Methoxychlor	0.00005	0.175
Molybdenum	--	0.14
Naphthalene	0.01	0.14
Nickel	0.04	0.7
Nitrate nitrite	--	3.5
Nitrobenzene	0.01	0.00854
N-nitroso-di-n-propylamine	0.01	0.000005

TABLE N.2-2
(Continued)

Chemical	CRQL	RBQL
N-nitrosodiphenylamine	0.01	0.00714
Parathion methyl	--	0.00875
Pentachlorophenol	0.025	0.000292
Phenanthrene	0.01	--
Phenol	0.01	21.0
Potassium	5.0	--
Pyrene	0.01	1.05
Pyridine	--	0.035
Selenium	0.005	0.175
Silver	0.010	0.105
Sodium	5.0	--
Styrene	0.01	0.00117
Tetrachlorethene	0.01	0.000684
Thallium	0.01	0.105
Toluene	0.01	7.0
Toxaphene	0.005	0.0000318
Trichloroethene	0.01	0.00318
Vanadium	0.05	0.245
Vinyl acetate	--	35.0
Vinyl chloride	0.01	0.0000184
Total xylenes	0.01	70.0
Zinc	0.02	7.0
Zinc (soluble)	0.02	7.0

N.3.0 CALCULATION OF RBQLs

As noted in Section N.2.0, the RBQL is the concentrations of a constituent in a given medium that would result in an incremental lifetime cancer risk of 1×10^{-6} for carcinogens or a hazard index of 1.0 for non-carcinogens. Each RBQL is calculated for the specific exposure scenarios and parameters as follows:

$$RBQL_c = \frac{1 \times 10^{-6}}{[(SF_o)(IR)(EF)(ED)]/[(AT)(BW)]} \qquad \text{(N-3-1)}$$

$$RBQL_n = \frac{[(AT)(BW)(RFD_o)]}{[(IR)(EF)(ED)]} \qquad \text{(N-3-2)}$$

where

$RBQL_c$ = RBQL for carcinogens
$RBQL_n$ = RBQL for non-carcinogens
SF_o = Oral cancer slope factor (chemical-specific)
RFD_o = Oral reference dose (chemical-specific) (EPA 1991a)
IR = Ingestion rate of a given medium
- Soil
  - Carcinogens: IR = 0.0001 kg/day throughout life
  - Noncarcinogens: IR = 0.0002 kg/day for ages 0-6
- Water
  - Carcinogens: IR = 2 ℓ/day
  - Noncarcinogens: IR = 2 ℓ/day

EF = Exposure frequency (365 days/year)
ED = Exposure Duration
- Soil
  - Carcinogens: ED = 70 years
  - Noncarcinogens: ED = 6 years
- Water
  - Carcinogens: ED = 70 years
  - Noncarcinogens: ED = 70 years

AT = Averaging Time
- Carcinogens: AT = 70 years x 365 days/year
- Noncarcinogens: AT = 365 X ED

BW = Body weight
- Adult: BW = 70 kg
- Child (age 0-6): BW = 16 kg

The calculated RBQL values for various chemicals in soil/sediment and water are listed in Tables N.2-1 and N.2-2, respectively. It should be noted that RBQL values have been calculated assuming an exposure duration of 70 years for carcinogens in soil and water and for non-carcinogens in water. The exposure duration recommended by EPA in recent guidance (EPA 1991b) is 30 years. Similarly, an exposure frequency of 365 days per year has been used for calculation of RBQL values, instead of the 350 days per year recently recommended by EPA (EPA 1991b). Use of the new values for the exposure duration and exposure frequency yields RBQL values that are approximately 2.4 times the values given in Tables N.2-1 and N.2-2.

If an SQL exceeds both the CRQL and RBQL, that SQL is excluded from the data set.

There are other situations when the SQL for a U-qualified sample exceeds either the CRQL or the RBQL, or when CRQL and/or RBQL values are not available (e.g., CRQL values are not listed in CLP or RBQL values cannot be calculated because toxicity values are not available) Table N.3-1 presents rules that are followed in such cases to determine if SQL values are included or excluded from statistical analyses of data sets.

TABLE N.3-1

RULES FOR ACCEPTING U-QUALIFIED SAMPLE DATA IN STATISTICAL ANALYSES

Cases		Decision
SQL Below CRQL?	SQL Below RBQL?	Use in Statistical Analyses?
YES	YES	YES[a]
YES	NO	YES[a]
YES	RBQL Not Available	YES[a]
NO	YES	YES[a]
NO	NO	NO
NO	RBQL Not Available	IF ≤ 2 X CRQL, YES[a]. IF > 2 X CRQL, NO.
CRQL Not Available	YES	YES[a]
CRQL Not Available	NO	NO
CRQL Not Available	RBQL Not Available	YES[a]

[a] If the use of ½SQL to represent the concentration of a constituent for a sample in the statistical analysis causes the upper 95% confidence interval on the mean (UCL) to exceed the maximum detected sample concentration, the maximum detected concentration is substituted for the UCL (EPA 1989b), and this value is used in subsequent fate and transport modeling or exposure assessment.

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